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FIRE-DANGER RATING IN THE FUTURE

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The forest resources of this country must be protected from wildfire. Protection does not eliminate fire but does reduce loss from fire. In recent years, more acres have been burned on the unprotected 3 percent of forest land than on the 97 percent under organized fire protection. Protection from fire has saved more than 100 million acres per year. This figure is based on an average burned-area rate of 10 percent for unprotected and 0.2 percent for protected lands.

The fire protection job has been accomplished by public and private expenditures of about $150 million per year. Because of intangible values, which often exceed timber losses, the dollar savings cannot be pinpointed, but are estimated to be at least a billion dollars per year Obviously, fire control pays its way.

The Forest Service objective with regard to fire-danger rating is "to provide forest officers with information on current fire danger to guide them in making the best and most economical use of force and facilities." The general policy is "to make maximum use of fire-danger rating in prevention, presuppression, and suppression action." An accurate, simple, yet complete system of fire-danger rating is needed to help accomplish the task of fire control decision making.

Prevention, presuppression, and suppression plans are the basis for actions taken at various levels of administration during the fire season. An important part of presuppression planning by the U.S. Forest Service is the Manning and Specific Action Guide which is based on fire-danger rating. This guide specifies manpower, equipment, and action required each day depending on the level of fire danger forecast for the management unit. Both the basic protection organization and the emergency organization are considered in planning. These plans affect the actions of the fire control staff at the district, forest, and regional levels of administration.

Most fire control people are familiar with the history of fire-danger rating and are aware of recent advances made with the completion of the Spread Phase of the National System of fire-danger rating. The Spread Phase tables, providing for the computation of a Spread Index and a Buildup Index, have been adopted by most Forest Service and other Federal units and some States. Other elements of fire behavior--risk, ignition, and fire intensity--are not considered in the Spread Phase.

Where do we go from here in fire-danger rating? The National Fire-Danger Rating Project, formerly located at the Southeastern Forest Experiment Station, Asheville, N.C., has been transferred to Seattle, Wash., as a part of Pacific Northwest Forest and Range Experiment Station research. The objective of the project is to develop a fire-danger rating system adequate for application to all forest and range types in the continental United States. In doing this, the project expects to extend the efforts of those who developed the Spread Phase of the National System.

Analytical research is establishing use-related specifications for additional fire-danger rating indexes, as well as structural framework for these indexes. Research data will be drawn from appropriate fields to develop the indexes in quantitative form. It should be understood that any index, present or future, will need to be updated from time to time as new information becomes available. It should also be understood

that a certain amount of study and testing will be needed to adapt any national index to local use. The testing of any new index(es) will include field trials and comparisons with historical records of weather, fire occurrence, and severity.

Fire control specialists realize that the analytical problem in danger rating is more involved than a simple component framework, involving four phases, might suggest. For example, there is some question whether risk can be separated from ignition in the early development work of the various phases of a system. Risk is defined as the number of firebrands landing on a fuel bed, and a direct method of measuring this element will ultimately be needed. The only available indicator at present, number of fire occurrences, is influenced by both risk and ignition probability. Another example of jointly determined fire-danger elements is the effect of fuel energy on rate of spread.

It is necessary to determine, by systems analysis, the indexes or integration of indexes that will be most useful to the fire control organization. An integral part of this application problem is the bridge from fire-danger indexes, based on fuel, weather, and risk conditions, to fire control planning and execution. How best to convert a physical index into on-the-ground decisions? What kind of index number system is needed by the fire dispatcher, the organization's fire chief, or the fire boss? What is the proper balance between simplicity and accuracy; between timeliness, sophistication of instrumentation, and cost? To meet objectives of cost and precision, what is the best grid of danger stations for a particular set of physical, climatic, and administrative circumstances? These and other questions are being answered by analyzing fire control as a network of decisions, with each decision requiring its own kind of fire-danger information.

This system-analysis approach is expected to lead to one or more danger-rating schemes that can be interpreted with minimum effort in terms of preparedness levels and action plans. Thus, for example, a dispatcher sending a crew on initial attack should be able, with

pertinent information on fire location, size, topography, fuels, and access available to him at the moment, to convert a fire-danger-rating number into an estimate of the effort required to control the fire.

Underway at this time are two fact-finding studies to obtain information on national requirements and local variations in fire-danger rating, as a basis for future work in the project. The first study is concerned with the present status of fire-danger rating and how it is used in various parts of the country. The second study deals with how day-to-day fire control decisions are affected by fire-danger rating and what these decisions are. Future studies requiring laboratory research or collection of field data will be referred to fire research laboratories or selected cooperators.

Because this project is national in scope, cooperators will include various Federal and State fire control agencies. As in the past, similar cooperation from industry and universities is anticipated and welcomed.

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